Space Weather Forecast

Issued on Monday, 24 July 2023 at 13:27 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance Minor/Moderate R1/R2 radio blackouts from Moderate-class X-ray flares throughout. Chance of Minor Geomagnetic Storm late day 3 into day 4 (26th/27th July).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low. A long-period Common-class flare was observed at 23/1457UTC, with this associated with a Coronal Mass Ejection (CME) from a sunspot region in the northwest quadrant. This feature has been modelled, with a glancing blow possible around the turn of the UTC day 26th into 27th July. Another drawn out flare signature, peaked at 24/0427 UTC from a large region approaching the northwest horizon, with a possible filament eruption occurring to the south of this, however no CME is yet visible in the available imagery.
There are currently up to eight sunspot regions on the Earth-facing side of the Sun. The most complex region of the current front-side is magnetically simpler than in recent days and is now also showing a reduction in size. A similar reduction in complexity was also seen in two of the other main sunspot groups. However, the region emerging round the southeast horizon is becoming clearer to view as it rotates further onto the visible disc and is showing increased complexity. All other regions on the disc remain small or simple.

Solar Wind / Geomagnetic Activity: The solar wind suggests connection to a weak high speed stream, most likely from a coronal hole which is currently indistinct on the southwestern solar horizon. Solar wind speeds were consequently slightly elevated, between 400 and 480km/s. The number of particles comprising the solar wind was level and below the long-term average, while their associated magnetic field was steady and within background. The north-south component of this field showed a gradual drift from mainly anti-aligned to co-aligned with Earth's field (the former usually to greater geomagnetic effect). Resultant geomagnetic activity was Quiet to Unsettled (Kp 1-3).

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity carries a daily chance of isolated Moderate-class flares, most likely from the most magnetically complex sunspot group in the northwest, which should leave the facing side of the Sun midweek. Far side soundings suggest possible returning regions from around the same time though.

Solar Wind / Geomagnetic Activity: A glancing blow from the 23 July CME is possible around the turn of the UTC day of 26 into 27 July. This brings a chance of a Minor Geomagnetic Storm should it affect Earth. Otherwise, a further high speed stream from a coronal hole is forecast to connect with the Earth during 24 July.
Mainly Quiet to Unsettled geomagnetic activity is expected, with a slight chance of a G1/Minor Storm from a coronal hole on day 1 (24th), and a Chance late on the 26th into the 27th July should the CME mentioned above affect Earth.

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Energetic Particles / Solar Radiation: Solar radiation storms should most likely remain near background levels, although there is a daily slight chance of an S1+ (Minor Solar Radiation Storm or above) event, falling slightly as some of the more potent regions begin to rotate away onto the far side of the Sun later in the period.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	1	10	30
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	40	40	40	30
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	10	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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